

**Company
Compressor Station
, Montana**

**Montana Air Quality Preconstruction
Permit Application**

File: 07006

Prepared for:

**P.O. Box
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Prepared by:

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February 21, 2007

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1.0 INTRODUCTION

was contracted by
to prepare an air quality permit application for a
natural gas compression facility located approximately twenty miles southeast of
Montana known as the Compressor Station. This application requests the
issuance of a preconstruction permit from the Montana Department of Environmental
Quality (MDEQ).

proposes to install up to two natural gas-fired reciprocating compressor engines
with individual engine horsepower over 1,600 hp but not to exceed 1,775 hp.

1.1 NARRATIVE DESCRIPTION

Field gas is gathered from the local field wells and compressed in pipelines.

1.2 SITE MAPS

A site location map is presented in Appendix A.

1.3 NARRATIVE PROJECT SUMMARY

is proposing a flexible air quality permit which will allow several engine types
which are either already in inventory throughout the company or available to the
company through alternative means to be installed at anytime at the facility provided they
meet permit restrictions. By permitting the facility for a number of possible engine
combinations, will be able to meet air quality standards and regulations while being
better suited to respond to field conditions and client needs.

proposes to install at the Compressor Station up to two natural gas-fired
compressor engines not to exceed 1,775 hp individually. proposes to install
combinations of the following engine types:

Compressor Station

Up to 2 of the following:

- Caterpillar G3520 B (1,675 hp)
- Waukesha 7044 GSI (1,680 hp)
- Caterpillar G3606 (1,775 hp)

Four-stroke lean burn compressor engines include the Caterpillar G3520 B, and the Caterpillar G3606. The four-stroke lean burn engines will be installed with an oxidation catalyst to satisfy BACT requirements. Rich burn compressor engines include the Waukesha 7044 GSI, which will be installed with air/fuel ratio controllers and non-selective catalytic reduction catalysts to satisfy BACT requirements.

1.4 PROJECT AND SITE INFORMATIONAL REQUEST

Site information is included in the application forms provided in Appendix B.

1.5 PUBLIC NOTICE

As required by Administrative Rules of Montana (ARM) 17.8.748(7), an applicant for a preconstruction permit shall notify the public of the application by legal publication in a newspaper of general circulation in the area affected by the application.

will provide a public notice for publication in the Herald within ten days of application submittal. A copy of the published notice will be forwarded to MDEQ as soon as it is received.

2.0 EMISSIONS INVENTORY

Emissions from the compressor engines were determined using proposed manufacturer's data (and proposed BACT limits) for nitrogen oxides (NO_x), carbon monoxide (CO), and volatile organic compounds (VOCs). EPA document AP-42, Section 3.2, emission factors for *Natural Gas-Fired Reciprocating Engines*, was used to calculate sulfur oxides (SO_x) and particulate matter (PM) emissions. Table 2-1 presents an emissions summary of each of the proposed engines considered in this permitting action. Table 2-2 presents a Facility-wide total potential emissions summary based on worst-case engine configurations.

Emissions inventory spreadsheets are included in Appendix C.

TABLE 2-1
POTENTIAL EMISSIONS SUMMARY – INDIVIDUAL ENGINES
COMPRESSOR STATION
COMPANY

| Engine Model | Rating | NO _x tons/yr | CO tons/yr | VOC tons/yr | SO _x tons/yr | PM tons/yr | HCHO tons/yr |
|--|--------|----------------------------|---------------|----------------|----------------------------|---------------|-----------------|
| Engines (up to 2) – Reciprocating Compressors | | | | | | | |
| Caterpillar G3520 B | 1,675 | 16.17 | 8.09 | 16.17 | 0.030 | 0.00 | 1.13 |
| Waukesha 7044 GSI | 1,680 | 16.22 | 32.44 | 16.22 | 0.034 | 0.55 | 0.81 |
| Caterpillar G3606 | 1,775 | 12.00 | 8.57 | 17.14 | 0.030 | 0.49 | 1.20 |

Notes: All emissions calculated on the basis of 8,760 hours per year of operation for each engine.

NO_x Nitrogen Oxides
CO Carbon Monoxide
VOC Volatile Organic Compounds
SO_x Sulfur Oxides
PM Particulate Matter
HCHO Formaldehyde
tons/yr Tons per Year
hp Horsepower

The total facility-wide potential emissions were determined by selecting the worst case engine combination for NO_x and then for CO, in which the criteria of no more than two engines were met. The remaining criteria pollutants were selected from the engines listed below and shown as shaded items in Table 2-2.

Worst case NO_x engine configuration:

Two Waukesha 7044 GSI (1,680 hp)

Worst case CO engine configuration:

Two Waukesha 7044 GSI (1,680 hp)

TABLE 2-2
POTENTIAL EMISSIONS SUMMARY – FACILITY TOTAL
COMPRESSOR STATION
COMPANY

| Engine Model | Horsepower Rating | NOx tons/yr | CO tons/yr | VOC tons/yr | SOx tons/yr | PM tons/yr | HCHO Tons/yr |
|--------------------------------|----------------------|----------------|---------------|----------------|----------------|---------------|-----------------|
| Large Engines (up to 2) | | | | | | | |
| Caterpillar G3520 B | 1675 | 16.17 | 8.03 | 16.17 | 0.030 | 0.004 | 1.130 |
| Waukesha 7044 GSI | 1680 | 16.22 | 32.44 | 16.22 | 0.034 | 0.551 | 0.811 |
| Waukesha 7044 GSI | 1680 | 16.22 | 32.44 | 16.22 | 0.034 | 0.551 | 0.811 |
| Caterpillar G3606 | 1775 | 12.00 | 8.57 | 17.14 | 0.030 | 0.004 | 1.200 |
| Facility Total | | 32.44 | 64.89 | 32.44 | 0.068 | 1.101 | 1.622 |

Notes: Facility Total is the sum of shaded areas. Shaded areas are the worst case emissions for each NOx and CO engine configuration. Remaining criteria pollutants were chosen based on the highest emission rate from the engines which were selected in the worst case engine configuration.

NO_x Nitrogen Oxides
CO Carbon Monoxide
VOC Volatile Organic Compounds
SO_x Sulfur Oxides
PM Particulate Matter
HCHO Formaldehyde
tons/yr Tons per Year
hp Horsepower

3.0 PERMITTING ANALYSIS

The Compressor Station does not have the potential to emit more than 100 tons per year (tpy) of any criteria pollutant. Therefore, this facility is considered a minor source and is not required to obtain a Title V operating permit. Table 3-1 summarizes the proposed emission limits.

**TABLE 3-1
PROPOSED EMISSION LIMITS
COMPRESSOR STATION
COMPANY**

| Engine | | NO _x | | CO | | VOC | |
|---------------------|-------------|-----------------|-------|----------|-------|----------|-------|
| Type | Rating (hp) | g/bhp-hr | lb/hr | g/bhp-hr | lb/hr | g/bhp-hr | lb/hr |
| Caterpillar G3520 B | 1,675 | 1.00 | 3.69 | 0.50 | 1.85 | 1.00 | 3.69 |
| Waukesha 7044 GSI | 1,680 | 1.00 | 3.70 | 2.00 | 7.41 | 1.00 | 3.70 |
| Caterpillar G3606 | 1,775 | 0.70 | 2.74 | 0.50 | 1.96 | 1.00 | 3.91 |

Notes:

g/bhp-hr

Grams per Brake Horsepower-Hour

lb/hr

Pounds per Hour

NO_x

Nitrogen Oxides

CO

Carbon Monoxide

VOC

Volatile Organic Compounds

hp

Horsepower

3.1 AMBIENT AIR QUALITY ATTAINMENT STATUS

The Compressor Station is located in County, Montana. County is listed as either an unclassifiable attainment area, or better than the national standards for all ambient air quality standards as defined in Title 40 of the Code of Federal Regulations (CFR) Part 81.327.

According to the *Montana Modeling Guideline for Air Quality Permits*, sources that emit less than 100 tpy of NO_x or CO, or 50 tpy of PM₁₀ or SO₂ are not required to model unless specifically requested by MDEQ. Therefore, no modeling analysis has been performed.

Due to the relatively low emissions from this facility, this source will not adversely impact ambient air quality.

3.2 EMISSION STANDARDS

ARM 17.8.301 *et seq.* provides mandatory emission standards, such as visibility requirements. will comply with these regulations.

3.3 BEST AVAILABLE CONTROL TECHNOLOGY

According to ARM 17.8.752(1), the owner or operator of a new or modified facility or emitting unit for which a Montana air quality permit is required...shall install on the new or modified facility the maximum air pollution control capability that is technically practicable and economically feasible, except that: (a) best available control technology (BACT) must be utilized.

In general, MDEQ recommends a top-down BACT approach. This includes the consideration of all available control technologies, ranking them by control efficiency, and then evaluating them based on technical feasibility, cost effectiveness, and environmental effects.

Starting with the most efficient technology, that particular technology is evaluated on the above criteria. If that technology is eliminated based on any of the three criteria, then the next most effective technology is reviewed until one cannot be eliminated and BACT is determined.

proposes to utilize lean burn engines with oxidation catalysts and rich burn engines with NSCR catalysts and AFR control depending on engine availability from the engine vendors and from the inventory.

Because of environmental effects from controlled rich burn and lean burn engines, neither should be given priority as BACT. Rich burn engines generally produce more

CO than controlled lean burn engines (while equivalent for NO_x) and are therefore less favorable when it comes to criteria pollutants. However, lean burn engines should not be readily accepted as BACT. Lean burn engines produce more hazardous air pollutants (formaldehyde) and ammonia than rich burns causing a negative effect on the environment. therefore asserts that both rich burn engines (favorably low HAP emissions) and lean burn engines (favorably low CO emissions) should be deemed equitable as BACT. however, is submitting additional data to support BACT conclusions.

3.4 BACT ANALYSIS

For control of NO_x from gas-fired compressor engines, the following technologies are considered and ranked by effectiveness.

- 1) Lean burn engine with oxidation catalyst and air to fuel ratio (AFR) control, or a rich burn engine with non-selective catalytic reduction (NSCR) and AFR control.
- 2) Selective catalytic reduction and AFR control.
- 3) AFR control only.
- 4) No control.

For control of CO from gas-fired compressor engines, the following technologies are considered and ranked by effectiveness.

- 1) Lean burn engine with oxidation catalyst and air to fuel ratio (AFR) control.
- 2) Rich burn engine with non-selective catalytic reduction (NSCR) and AFR control.
- 3) Lean burn engine without oxidation catalyst.
- 3) AFR control only.
- 4) No control.

is permitting the Compressor Station requiring the flexibility to change out engines on a relatively short notice. As the gas fields diminish, or more wells are added to the system, the total horsepower at the facility must be adjusted to meet the demands.

needs to have a flexible permit in order to meet customer demands on a timely basis. Therefore, has proposed several different engine options which may be added or changed out at the facility depending on engine availability and customer needs. To utilize engines correctly, when a customer requires a change in the amount of gas moved, must select an engine with the correct amount of horsepower to efficiently run their process. As such, the BACT analysis is broken down into comparable horsepower ranges to appropriately identify like engine alternatives.

If a cost analysis was necessary, the BACT analysis followed the estimation procedures presented in the Office of Air Quality, Planning, and Standards (OAQPS), "Cost Control Manual". Capital costs were estimated using industry experience for the cost of catalysts and engines. Annual costs were also estimated using OAQPS methodology.

Once annual costs were determined, the cost effectiveness was determined. Cost effectiveness for each technology considered was determined by dividing the amount of pollutant controlled (uncontrolled emissions minus the controlled emissions resulting from the control technology) by the annual cost incurred to provide the control. The resulting dollar per ton number was compared to acceptable BACT cost levels.

3.4.1 1,600 to 1,800 HP ENGINES

Engines in this category are the Waukesha 7044 GSI (1,680 hp), the Caterpillar G3520B (1,675 hp), and the Caterpillar G3606 (1,775 hp). The Caterpillar G3520B and Caterpillar G3606 engines are shown to be cost prohibitive for CO, however, requests the ability to utilize these engines as alternatives which exceed BACT standards. The Waukesha 7044 GSI is proposed as BACT. The proposed emission limits for these engines are consistent with recently permitted engines of these types.

**TABLE 3-2
CONTROL COST SUMMARY
COMPRESSOR STATION
COMPANY**

| Engines | Horsepower (hp) | Type | Control Equipment | Catalyst Cost (\$) | NOx Controlled g/hp-hr | CO Controlled g/hp-hr | Amount of NOx Controlled tpy | Amount of CO Controlled tpy | NOx Cost Effectiveness \$/ton | CO Cost Effectiveness \$/ton |
|--------------------------------|----------------------------|-------------|------------------------------|-----------------------------------|---------------------------------------|--------------------------------------|---|--|--|---|
| Caterpillar G3520 B (1,675 hp) | 1,675 | LB | LB/OC | \$20,000 | 1.0 | 0.5 | 16.2 | 40.4 | \$0 | \$3,278 |
| Waukesha 7044 GSI (1,680 hp) | 1,680 | RB | NSCR | \$25,000 | 1.0 | 2.0 | 308.0 | 129.7 | \$439 | \$1,042 |
| Caterpillar G3606 (1,775 hp) | 1,775 | LB | LB/OC | \$20,000 | 0.7 | 0.5 | 22.3 | 42.8 | \$0 | \$3,243 |

3.5 PREVENTION OF SIGNIFICANT DETERIORATION

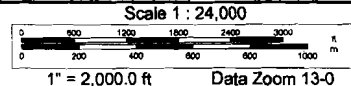
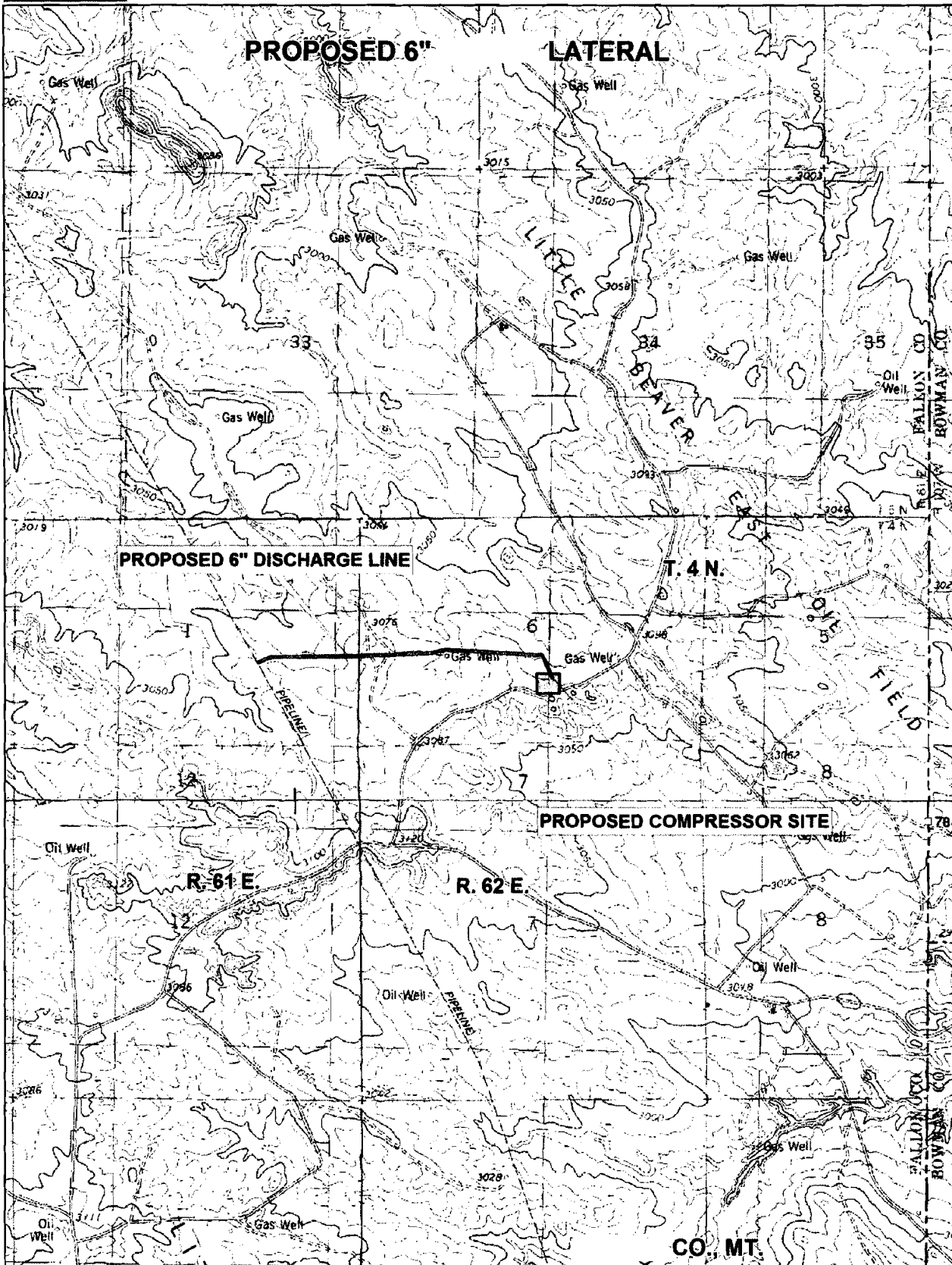
Prevention of Significant Deterioration (PSD) applies to major modifications at existing major stationary sources or for construction of an entirely new facility that exceeds the major stationary source threshold.

's Compressor Station does not exceed the major stationary source threshold and, therefore, PSD is not applicable.

4.0 CONCLUSIONS

Due to the relatively low emissions, the Compressor Station can be constructed without adversely impacting the NAAQS, MAAQS, or PSD increments.

APPENDIX A
FACILITY MAP



APPENDIX B
APPLICATION FORMS



Department of
Environmental Quality

Air and Waste Management Bureau • P.O. Box 200901 • Helena MT 59620-0901 • (406) 444-

3490

MONTANA AIR QUALITY PERMIT APPLICATION FOR STATIONARY SOURCES

Montana Department of Environmental Quality

Air and Waste Management Bureau

Permitting Section Supervisor

1520 E. Sixth Avenue

P.O. Box 200901

Helena, MT 59620-0901

Phone: (406) 444-3490

FAX (406) 444-1499

For State of Montana Use Only

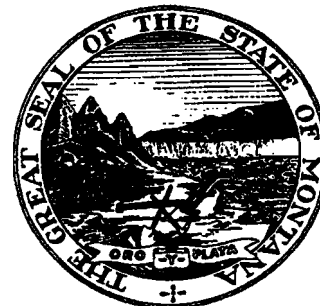
Permit Application Number 4061-00

Application Fee Paid with Application?

☒ Yes ☐ No Amount Paid \$500.00

AREV Facility # 025-0054 FP ID # _____

Four complete copies of the application, any associated fees, and the affidavit of publication of the attached public notice must be mailed to the above address. Instructions for filling out this form are contained in the Instructions and Suggested Format document available from the Department of Environmental Quality (department). Some information requested in this application may not be applicable to all facilities. Please contact the Air and Waste Management Bureau if you have any questions. A final permit will be issued within 76 days of the department's receipt of a complete application barring any appeals to the Board of Environmental Review (Board).



FACILITY NAME AND ADDRESS

| | | |
|--|--------------|------------------------|
| Company - Facility Name | | Compressor Station |
| Environmental and Pipeline Integrity Dept., Mailing Address | | Holdings, Inc., PO Box |
| MT State | 59330 Zip | |

PERMIT TYPE

☒ Air Quality Preconstruction Permit

☒ New Facility

☐ Alternation to Existing Permit

☐ Synthetic Minor (major source using federally enforceable permit conditions to avoid MACT, PSD, NSR, or Title V Operating Permit requirements)

A permit application fee and an affidavit of publication must be submitted to DEQ at the above address (for air quality preconstruction permit applications only)

Affidavit of Publication of Public Notice

☐ Attached

☒ Forthcoming

Permit Application Fee

☒ Attached

☐ Forthcoming

☐ Air Quality Operating Permit

☐ Initial Air Quality Operating Permit - - New Construction

☐ Initial Air Quality Operating Permit - - Existing Source

☐ Renewal of Air Quality Operating Permit

☐ Modification of Air Quality Operating Permit

Name of DEQ Contact _____

If you have been dealing with Department of Environmental Quality personnel

The estimated time for the department to process and act on a correctly completed application form is 60 days. The department has 30 days to notify an applicant that their application is incomplete. The department shall make a preliminary determination within 40 days after receiving a complete and filed application. A department decision must be made within 60 days after receiving a complete application. The department decision is not final unless 15 days have elapsed from the date of the department decision and there is no request for a hearing before the Board of Environmental Review. (Different time frames apply if an Environmental Impact Statement is required or if the Major Facility Siting Act is applicable. Provisions also exist in rule for extending the time for issuing a department decision). Please refer to ARM 17.8.706(2), ARM 17.8.720 and 75-2-211 MCA.

§ 1.0 GENERAL FACILITY INFORMATION AND SITE DESCRIPTION

| PHYSICAL LOCATION | | | |
|---|----------|--------------------|--------|
| Company - | | Compressor Station | |
| Address (if different from mailing address) | | | |
| Owner Info: [Do NOT send permit info to this address] | | | |
| Mailing Address | | | |
| Near | Montana | | |
| City | State | Zip | |
| SW¼, SE¼ Sec 6 | 4N | 62E | |
| Section (to nearest) | Township | Range | County |

| | | | |
|------------------------|------------------|-----------|----------|
| Owner's Name | Company | Telephone | 406-359- |
| Facility Manager' Name | District Manager | Telephone | 406-359- |
| Contact Person | Holdings, Inc. | Telephone | 406-359- |

General Nature of Business Natural gas gathering

Standard Industrial Classification Codes(s) 1311

Standard Industrial Classification Description(s) Operating natural gas field properties—oil and gas extraction

Total Property Area Approx. 2.41 Acres Current Number of Employees Not Applicable

Estimated Capital Expenditure for Proposed Project ^{1,2} X

Estimated Cost of Air Pollution Control Equipment ^{1,2} X

Number of Permanent New Employees as a Result of the Proposed Project ² X

Permit numbers and permit type of any previous or existing air quality permits issued to this facility (need not include air quality permit whose requirement have been superseded). None

| | | |
|--|--------------------------------|----------------------------------|
| Construction/Installation Schedule: ² | <u>June 2007</u> | <u>September 2010</u> |
| | <i>Estimated Starting Date</i> | <i>Estimated Completion Date</i> |
| Duration (temporary source): ² | <u></u> | <u></u> |
| | <i>Estimated Starting Date</i> | <i>Estimated Completion Date</i> |

§ 1.1 Narrative Description of the Site and Facility

§ 1.2 Site Map

§ 1.3 Narrative Project Summary ²

§ 1.4 Project and Site Information Request. (Complete the questionnaire on pages 11 and 12 of the application) ²

¹ This information is optional and not required. You may supply an estimate, state a range, or decline to supply this information.

² Not required for operating permit applications.

§ 2.0 EMISSION UNIT LISTING

Attach a list of all existing and proposed emission units. For air quality operating permits only, note all insignificant emission units.

[illegible]

§ 3.0 EMISSIONS UNIT SPECIFIC AND PLANT-WIDE EMISSIONS SUMMARY

§ 3.1 Emissions Unit Specific Emission (*Reproduce as necessary*)

§ 3.1.1 Emissions Unit Identification **Caterpillar G3520 B Compressor Engine (1,675 hp)**

§ 3.1.2 Potential Emissions Summary ³

| Regulated Air Pollutant | Emission Rate(s) (Include any additional applicable units or averaging periods) | | |
|---------------------------|--|-------------|-------------------------------|
| | (Lb/Hour) | (Tons/Year) | (Alternate averaging periods) |
| PM ₁₀ | 0.001 | 0.004 | |
| SO ₂ | 0.004 | 0.017 | |
| Pb | NA | NA | |
| NOx | 3.69 | 16.17 | |
| VOC | 3.69 | 16.17 | |
| CO | 1.85 | 8.09 | |
| Other (<i>specify</i>): | - | - | |
| Other (<i>specify</i>): | - | - | |
| Other (<i>specify</i>): | - | - | |
| Other (<i>specify</i>): | - | - | |
| Other (<i>specify</i>): | - | - | |
| Other (<i>specify</i>): | - | - | |

³ Include emission rates in units consistent with any applicable standards or test methods. Attach calculations.

§ 3.0 EMISSIONS UNIT SPECIFIC AND PLANT-WIDE EMISSIONS SUMMARY

§ 3.1 Emissions Unit Specific Emission (*Reproduce as necessary*)

§ 3.1.1 Emissions Unit Identification Waukesha 7044 GSI Compressor Engine (1,680 hp)

§ 3.1.2 Potential Emissions Summary ⁴

| Regulated Air Pollutant | Emission Rate(s) (Include any additional applicable units or averaging periods) | | |
|---------------------------|--|-------------|-------------------------------|
| | (Lb/Hour) | (Tons/Year) | (Alternate averaging periods) |
| PM ₁₀ | 0.13 | 0.55 | |
| SO ₂ | 0.008 | 0.034 | |
| Pb | NA | NA | |
| NO _x | 3.70 | 16.22 | |
| VOC | 3.70 | 16.22 | |
| CO | 7.41 | 32.44 | |
| Other (<i>specify</i>): | - | - | |
| Other (<i>specify</i>): | - | - | |
| Other (<i>specify</i>): | - | - | |
| Other (<i>specify</i>): | - | - | |
| Other (<i>specify</i>): | - | - | |
| Other (<i>specify</i>): | - | - | |

⁴ Include emission rates in units consistent with any applicable standards or test methods. Attach calculations.

§ 3.0 EMISSIONS UNIT SPECIFIC AND PLANT-WIDE EMISSIONS SUMMARY

§ 3.1 Emissions Unit Specific Emission (*Reproduce as necessary*)

§ 3.1.1 Emissions Unit Identification Caterpillar G3606 Compressor Engine (1,775 hp)

§ 3.1.2 Potential Emissions Summary ⁵

| Regulated Air Pollutant | Emission Rate(s) (Include any additional applicable units or averaging periods) | | |
|---------------------------|--|-------------|-------------------------------|
| | (Lb/Hour) | (Tons/Year) | (Alternate averaging periods) |
| PM ₁₀ | 0.03 | 0.004 | |
| SO ₂ | 0.007 | 0.030 | |
| Pb | NA | NA | |
| NOx | 2.74 | 12.00 | |
| VOC | 1.96 | 8.57 | |
| CO | 3.91 | 17.14 | |
| Other (<i>specify</i>): | - | - | |
| Other (<i>specify</i>): | - | - | |
| Other (<i>specify</i>): | - | - | |
| Other (<i>specify</i>): | - | - | |
| Other (<i>specify</i>): | - | - | |
| Other (<i>specify</i>): | - | - | |

⁵ Include emission rates in units consistent with any applicable standards or test methods. Attach calculations.

§ 3.2 Project-Wide Emission Summary ²

§ 3.2.1 **Estimated** Increase in **Actual** Emissions from all New or Altered Sources addressed by this application.

This information is used to establish the application fee required. Estimated actual emissions are to be calculated based on the proposed operating schedule and the projected average process rate.

| Regulated Air Pollutants | Emission Rate (Ton/Year) |
|-------------------------------|--------------------------|
| PM ₁₀ | 1.101 |
| SO ₂ | 0.068 |
| Pb | NA |
| NOx | 32.44 |
| VOC | 32.44 |
| CO | 64.89 |
| Other (specify): Formaldehyde | 1.622 |
| Other (specify): | - |
| Other (specify): | - |

§ 3.2.2 Total Increase in **Potential** Emissions from those New or Altered Sources addressed by this application.

This table should be a total from the emissions units identified in Section 3.1. Potential emissions are to be calculated based on production at maximum capacity for 8760 hours per year. Only controls which are proposed to be made federally enforceable may be used to limit the potential emissions.

| Regulated Air Pollutants | Emission Rate (Ton/Year) |
|-------------------------------|--------------------------|
| PM ₁₀ | 1.101 |
| SO ₂ | 0.068 |
| Pb | NA |
| Nox | 32.44 |
| VOC | 32.44 |
| CO | 64.89 |
| Other (specify): Formaldehyde | 1.622 |
| Other (specify): | - |
| Other (specify): | - |

² Not required for operating permit applications

§ 4.0 EMISSIONS UNIT/PROCESS INFORMATION§ 4.1 Emissions Unit Identification Caterpillar G3520 B Compressor Engine (1,675 hp)§ 4.2 Narrative Process Equipment/Process Description *(attach additional sheets as necessary)***Engine used for gas compression.**§ 4.3 Proposed Operational Limitations *(if any)* None

§ 4.4 Emissions Unit Description

Sources Classification Code (SCC) _____

Source Description Internal Combustion Engines – Industrial: Natural Gas, Reciprocating*(SCC Code and Description list available from the DEQ)*Title IV Affected Unit ☐ Yes ☒ No**Process Equipment Identification**Make CaterpillarModel 3520 BType Lean Burn EngineSize 1,675 hpSerial Number NAYear of Manufacture NAYear of Installation NA**Emitting Unit Location** *[Note: UTM coordinates are available on any USGS map]*Universal Transverse Mercator (UTM) Zone 13 Elevation (feet) 3,094UTM Easting Coordinate (nearest 0.01 km) 571,973UTM Northing Coordinate (nearest 0.01 km) 5,108,896**Stack and Exit Gas Information** *(if applicable)*Height (feet) 30.5 Diameter (feet) 1.25Exit Gas Temperature (°F) 952 Exit Gas Flow Rate (ACFM) 9,261Exit Gas Velocity (feet/second) 155.43 Exit Gas Moisture Content (%) NAStack Type *(check one)* ☐ Downward Exit ☐ Multiple Actual Stacks ☐ Fugitive Source (No Stack)☐ Horizontal Exit ☐ Building Roof Vent ☐ Process Vent☒ Vertical Exit ☐ Vertical Exit with CapStack Lining *(check one)* ☒ Metal ☐ Refractory ☐ Other *(specify)* _____**Process Information** *(Indicate Units)*Type of Material Processed Natural Gas

Average Process Rate or Process Weight _____

Maximum Rated Design Capacity NAApproximate Quantities Produced *(if source is temporary)* _____**Fuel/Combustion Information**Fuel Type Natural Gas Heat Content (Btu rating) Approx. 990 Btu/scfAverage Fuel Combustion Rate 7,082 Btu/hp-hr Maximum Rated Design Capacity 7,082 Btu/hp-hrSulfur Content (%) nil Ash Content (%) nilDraft Type *(check one)* ☐ Forced ☐ Induced ☐ Natural ☐ Combination ☐ NoneDraft Control *(check one)* ☐ Barometer ☐ Sliding Door ☐ Butterfly ☐ Guillotine☐ Other *(specify)* _____Draft Control Location ☐ Up Pass Breeching ☐ Five Connector☐ Other *(specify)* _____**Percent Annual Thruput***(Percent of the applicant's work done in each time frame. The percentages entered for the four time frames must add up to 100%.)*December - February 25% June - August 25%March - May 25% September - November 25%

§ 4.0 EMISSIONS UNIT/PROCESS INFORMATION

§ 4.1 Emissions Unit Identification Waukesha 7044 GSI Compressor Engine (1,680 hp)

§ 4.2 Narrative Process Equipment/Process Description (attach additional sheets as necessary)

Engine used for gas compression.

§ 4.3 Proposed Operational Limitations (if any) None

§ 4.4 Emissions Unit Description

Sources Classification Code (SCC) _____

Source Description Internal Combustion Engines – Industrial: Natural Gas, Reciprocating
(SCC Code and Description list available from the DEQ)

Title IV Affected Unit ☐ Yes ☒ No

Process Equipment Identification

Make Waukesha
Type Rich Burn Engine
Serial Number NA
Year of Installation NA

Model 7044 GSI
Size 1,680 hp
Year of Manufacture NA

Emitting Unit Location [Note: UTM coordinates are available on any USGS map]

Universal Transverse Mercator (UTM) Zone 13 Elevation (feet) 3,094
UTM Easting Coordinate (nearest 0.01 km) 571,973
UTM Northing Coordinate (nearest 0.01 km) 5,108,896

Stack and Exit Gas Information (if applicable)

Height (feet) 30.5 Diameter (feet) 1.30
Exit Gas Temperature (°F) 867 Exit Gas Flow Rate (ACFM) 8,203
Exit Gas Velocity (feet/second) 115.48 Exit Gas Moisture Content (%) NA
Stack Type (check one) ☐ Downward Exit ☐ Multiple Actual Stacks ☐ Fugitive Source (No Stack)
☐ Horizontal Exit ☐ Building Roof Vent ☐ Process Vent
☒ Vertical Exit ☐ Vertical Exit with Cap
Stack Lining (check one) ☒ Metal ☐ Refractory ☐ Other (specify) _____

Process Information (Indicate Units)

Type of Material Processed Natural Gas
Average Process Rate or Process Weight _____
Maximum Rated Design Capacity NA
Approximate Quantities Produced (if source is temporary) _____

Fuel/Combustion Information

Fuel Type Natural Gas Heat Content (Btu rating) Approx. 990 Btu/scf
Average Fuel Combustion Rate 7,876 Btu/hp-hr Maximum Rated Design Capacity 7,876 Btu/hp-hr
Sulfur Content (%) nil Ash Content (%) nil
Draft Type (check one) ☐ Forced ☐ Induced ☐ Natural ☐ Combination ☐ None
Draft Control (check one) ☐ Barometer ☐ Sliding Door ☐ Butterfly ☐ Guillotine
☐ Other (specify) _____
Draft Control Location ☐ Up Pass Breeching ☐ Five Connector
☐ Other (specify) _____

Percent Annual Thruput

(Percent of the applicant's work done in each time frame. The percentages entered for the four time frames must add up to 100%.)

December - February 25% June - August 25%
March - May 25% September - November 25%

§ 4.0 EMISSIONS UNIT/PROCESS INFORMATION§ 4.1 Emissions Unit Identification Caterpillar G3606 Compressor Engine (1,775 hp)§ 4.2 Narrative Process Equipment/Process Description *(attach additional sheets as necessary)***Engine used for gas compression.**§ 4.3 Proposed Operational Limitations *(if any)* None

§ 4.4 Emissions Unit Description

Sources Classification Code (SCC) _____

Source Description Internal Combustion Engines – Industrial: Natural Gas, Reciprocating*(SCC Code and Description list available from the DEQ)*Title IV Affected Unit ☐ Yes ☒ No**Process Equipment Identification**Make CaterpillarModel G3606Type Lean Burn EngineSize 1,775hpSerial Number NAYear of Manufacture NAYear of Installation NA**Emitting Unit Location** *[Note: UTM coordinates are available on any USGS map]*Universal Transverse Mercator (UTM) Zone 13 Elevation (feet) 3,094UTM Easting Coordinate (nearest 0.01 km) 571,973UTM Northing Coordinate (nearest 0.01 km) 5,108,896**Stack and Exit Gas Information** *(if applicable)*Height (feet) 30.5 Diameter (feet) 1.5Exit Gas Temperature (°F) 867 Exit Gas Flow Rate (ACFM) 1,773Exit Gas Velocity (feet/second) 115.48 Exit Gas Moisture Content (%) NAStack Type *(check one)* ☐ Downward Exit ☐ Multiple Actual Stacks ☐ Fugitive Source *(No Stack)*☐ Horizontal Exit ☐ Building Roof Vent ☐ Process Vent☒ Vertical Exit ☐ Vertical Exit with CapStack Lining *(check one)* ☒ Metal ☐ Refractory ☐ Other *(specify)* _____**Process Information** *(Indicate Units)*Type of Material Processed Natural Gas

Average Process Rate or Process Weight _____

Maximum Rated Design Capacity NAApproximate Quantities Produced *(if source is temporary)* _____**Fuel/Combustion Information**Fuel Type Natural Gas Heat Content (Btu rating) Approx. 990 Btu/scfAverage Fuel Combustion Rate 6,620 Btu/hp-hr Maximum Rated Design Capacity 6,620 Btu/hp-hrSulfur Content (%) nil Ash Content (%) nilDraft Type *(check one)* ☐ Forced ☐ Induced ☐ Natural ☐ Combination ☐ NoneDraft Control *(check one)* ☐ Barometer ☐ Sliding Door ☐ Butterfly ☐ Guillotine☐ Other *(specify)* _____Draft Control Location ☐ Up Pass Breeching ☐ Five Connector☐ Other *(specify)* _____**Percent Annual Thruput***(Percent of the applicant's work done in each time frame. The percentages entered for the four time frames must add up to 100%.)*December - February 25% June - August 25%March - May 25% September - November 25%

§ 5.3 Continuous Emission Monitoring System #1 Identification *(if applicable)*

Type *(check one)* ☐ Opacity SO₂ ☐ NO_x ☐ O₂ ☐ CO ☐ CO₂ ☐ TRS
☐ Other *(specify)* _____

Make _____ Model _____

Serial Number _____

Automatic Calibration Valve: Zero _____ Span _____

§ 5.3.1 Continuous Emission Monitoring System #2 Identification *(if applicable)*

Type: *(check one)* ☐ Opacity SO₂ ☐ NO_x ☐ O₂ ☐ CO ☐ CO₂ ☐ TRS
☐ Other *(specify)* _____

Make _____ Model _____

Serial Number _____

Automatic Calibration Valve: Zero _____ Span _____

§ 5.3.2 Continuous Emission Monitoring System #3 Identification *(if applicable)*

Type *(check one)* ☐ Opacity SO₂ ☐ NO_x ☐ O₂ ☐ CO ☐ CO₂ ☐ TRS
☐ Other *(specify)* _____

Make _____ Model _____

Serial Number _____ Year of Manufacture _____

Automatic Calibration Valve Zero _____ Span _____

§ 5.4² Emissions Control Analysis

Provide a Best Available Control Technology (BACT) or Lowest Achievable Emission Rate (LAER) Analysis as applicable. Address each regulated air pollutant.

§ 5.5 Stack Height and Dispersion Technique Analysis

If applicable, supply an analysis demonstrating compliance with the requirements of the stack height and dispersion technique rules.

² Not required for operating permit applications

§ 6.0 REGULATORY PROGRAMS

Applicable Air Pollution Control Programs (*check all that apply*)

- ☒ Air Quality Preconstruction Permits
☐ Prevention of Significant Deterioration (PSD)
☐ Air Quality Operating Permits (Title V)
☐ Major Source (> 100 TPY)
☐ Non-Attainment Area
☐ Regulated Air Pollutant(s) _____ ☐ Located in, or ☐ Causing or contributing to
☐ New Source Performance Standards (NSPS) (*specify applicable subpart(s) and identify affected facilities*)

- ☐ NESHAPS (*specify*) _____
☐ Title III Hazardous Air Pollutants (HAPs) [>10 TPY of any single HAP or 25 TPY of a combination of all HAPs combined]
☐ Maximum Achievable Control Technology (MACT)
☐ Title IV (Acid Rain) Affected Source
☐ Other(s) (*specify*) _____

§ 7.0 APPLICABLE REQUIREMENTS

§ 7.1 Applicable Requirements (*if applicable*)

Attach a complete listing of all applicable requirements.

| § 7.2 | Additional Requirements | Required | Submitted |
|------------------------|---|--------------------------|--------------------------|
| § 7.2.1 ² | Ambient Air Quality Impact Analysis | <input type="checkbox"/> | <input type="checkbox"/> |
| § 7.2.2 ^{2,4} | Alternative Siting Analysis | <input type="checkbox"/> | <input type="checkbox"/> |
| § 7.2.3 ⁵ | Alternative Operating Scenario | <input type="checkbox"/> | <input type="checkbox"/> |
| § 7.2.4 ⁶ | Compliance Schedule/Plan | <input type="checkbox"/> | <input type="checkbox"/> |
| § 7.2.4 | Compliance Certification | <input type="checkbox"/> | <input type="checkbox"/> |
| § 7.2.6 ⁷ | Additional requirements for solid or hazardous waste incinerators or BIFS subject to 75-10-406 MCA. | <input type="checkbox"/> | <input type="checkbox"/> |
| § 7.2.6 ⁸ | Additional Requirements for Commercial Medical and Commercial Hazardous Waste Incinerators including BIFS Subject to 75-10-406 MCA. | <input type="checkbox"/> | <input type="checkbox"/> |

² Not required for operating permit applications

⁴ Only required for air quality preconstruction permits for major stationary sources located in a nonattainment area or for major stationary sources located in an area designated as attainment or unclassified for a national ambient air quality standard (NAAQS) under 40 CFR 81.327 but would cause or contribute to a violation of a NAAQS in a nearby nonattainment area (i.e., for those sources required to obtain an air quality preconstruction permit and required to comply with the requirements of subchapters 17 and 18).

⁵ Not required for air quality preconstruction permit applications.

⁶ Only required for air quality operating permit applications for sources already operating.

⁷ Required only for preconstruction permit applications for Solid or Hazardous Waste Incinerators or BIFS Subject to 75-10-406 MCA.

⁸ Required only for preconstruction permit applications for Commercial Medical and Commercial Hazardous Waste Incinerators including BIFS Subject to 75-10-406 MCA.

§ 8.0 INSTRUCTIONS ON PUBLIC NOTICE FOR AIR QUALITY PRECONSTRUCTION PERMIT

The applicant shall publish the following notification no earlier than 10 days prior to the date the applicants air quality preconstruction permit application will be submitted to the department, and no later than 10 days following the date of submittal. The notice shall be published **once** in the legal notice section of a newspaper of general circulation in the area affected. Any fees associated with publication of this notice are the responsibility of the permit applicant. Questions regarding an appropriate newspaper should be addressed to the department. An Affidavit of Publication of Public Notice must be submitted with the application or the air quality preconstruction permit application will be deemed incomplete. This notice is required by the air quality rules. **The notice to be published consists of the exact language, excluding the text in italics, within the box below.**

| PUBLIC NOTICE | |
|---|---|
| Notice of Application for Air Quality Preconstruction Permit (pursuant to Sections 75-2-211, and 75-2-215 MCA, and the Air Quality Rules). | |
| <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;"> will file <small>has filed/will file</small> </div> <div style="text-align: center;"> 2-19-07 <small>date</small> </div> </div> | <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;"> <small>Name of applicant(s)</small> _____ </div> <div style="text-align: center;"> an application for a air quality </div> </div> |
| preconstruction permit or an alternation to an existing air quality preconstruction permit from the Montana Department of Environmental Quality (department). Applicant(s) seeks approval of its application for: | |
| A natural gas compressor station located near _____, Montana (SW¼, SE¼ Section 6, Township 4 North, Range 62 East, _____ County). | |
| <div style="text-align: center; font-size: small;"> <i>(brief description of source for which permit is being applied, and the site location including 1) a narrative description related to nearby towns, roads, landmarks, etc., and 2) the legal description of section, township, range, and county)</i> </div> | |
| <p>Within 40 days of the receipt of a completed application, the department will make a preliminary determination whether the permit should be issued, issued with conditions, or denied. <u>Any member of the public with questions or who wishes to receive notice of the preliminary determination, and the location where a copy of the application and the DEQ's analysis of it can be reviewed, or to submit comments on the preliminary determination, must contact the DEQ at Department of Environmental Quality, Air Resources Management Bureau, Air Permitting Section Supervisor at P.O. Box 200901, Helena, Montana 59620-0901, telephone (406) 444-3490.</u> Any comments on the preliminary determination must be submitted to the department within 15 days after the preliminary determination is issued.</p> | |

Company -

Compressor Station


§ 9.0 CERTIFICATION OF ACCURACY AND COMPLETENESS

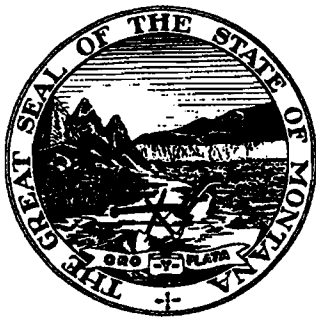
I hereby certify that, to the best of my knowledge, information and belief, formed after reasonable inquiry, the information provided in this permit application is true, accurate and complete.

(Name, title and signature of corporate officer, responsible official, authorized representative, or designated representative under Title IV 1990 FCAA.)

Name _____
(Print of Type)

Title Staff Engineer Telephone 406-359

Signature  Date 19 FEB 07
(Original Signature Required)



Project and Site Informational Request
Department of Environmental Quality
Air and Waste Management Bureau
P.O. Box 200901, Helena, MT 59620-0901
Telephone: (406) 444-3490 FAX: (406) 444-1499

Instructions: Please answer the questions listed below in reference to the current project proposed in the air quality permit application. Please attach additional pages if necessary. The department will use the information to facilitate completion of an environmental analysis required under the Montana Environmental Policy Act (MEPA).

Facility Name: _____ **Company -** _____ **Compressor Station** _____

1. Please summarize fish or wildlife habitat, animal or bird species, or any known migration or movement of animals at the project site.
Animals include deer, antelope, and coyotes. Migratory birds include geese and ducks.
2. Please describe any proposed discharges into surface water or onto the site; any changes in drainage patterns; any use of surface water and groundwater; and any potential impacts to wetlands.
No discharges are proposed into surface water or on the site. No changes in drainage pattern are proposed on the site. No use of surface or ground water is planned. No impacts to wetlands are anticipated.
3. Please summarize the soils and geology of the project site. Include a description of any disruption, displacement, erosion, compaction, moisture loss, or over-covering of soil that would reduce productivity or fertility at the site. The description should include the amount of land disturbed in acres. Please describe any destruction or modification of any unique geologic or physical feature.
No destruction or modification of unique geology is expected.
4. Please summarize the plant species (including types of trees, shrubs, grasses, crops, and aquatic plants) at the site. The applicant should include a description of any known unique, rare, threatened, or endangered plant species at the site. In addition, please describe the land use at the project site.
Range land plants, grasses and some grazing crops for cattle.
5. Please summarize the aesthetic character of the project site and of the surrounding community or neighborhood. Include a description of recreational opportunities. Also include a description of noise levels created by the proposed project.
The character of the surrounding area is rural agricultural grazing land and infrastructure exists, which is utilized in natural gas and crude oil production.

6. Please describe any unique, rare, threatened, or endangered animal species that are at or near the site.
None known
7. Please describe any upgrading of utilities that may result from power demands from this project.
No major power upgrades are expected.
8. Please describe any known historical, archaeological, or paleontological sites at the project site.
None known.
9. Please summarize other industrial activities at or near the site, or any other permits that you hold which are, or may be, in effect at this site.
No other Industrial activities.
10. Please indicate the number of employees currently employed and the increase or decrease in the number of people employed at the site as a result of the proposed project.
will employ approximately 1/2 time person.
11. Please describe any unique cultures in the area that may be affected by the proposed application.
Not aware of any unique cultures that may be affected.
12. Please summarize any access to recreational or wilderness activities near the project site.
None known.
13. Please describe any state, county, city, USFS, BLM, or tribal zoning or management plans and goals that might affect the site.
Not aware of any zoning or management plans or goals that might affect this site.
14. Please indicate who owns the land at the proposed project site.
BLM
15. Please indicate the approximate distance to the nearest home or structure not associated with the project site.
None known.

APPENDIX C
EMISSIONS INVENTORY SPREADSHEETS

Company

Compressor Station

2/14/07

Emission Factors

| Engine Type | | NO _x | | | |
|--------------------|------|-----------------|--------|--------|-----------------------|
| | HP | g/hp-hr | Factor | Units | Reference |
| Caterpillar 3520 B | 1675 | 1.00 | 3.69 | lbs/hr | Proposed Permit Limit |
| Waukesha 7044 GSI | 1680 | 1.00 | 3.70 | lbs/hr | Proposed Permit Limit |
| Caterpillar 3606 | 1775 | 0.70 | 2.74 | lbs/hr | Proposed Permit Limit |
| Engine Type | | CO | | | |
| | HP | g/hp-hr | Factor | Units | Reference |
| Caterpillar 3520 B | 1675 | 0.50 | 1.85 | lbs/hr | Proposed Permit Limit |
| Waukesha 7044 GSI | 1680 | 2.00 | 7.41 | lbs/hr | Proposed Permit Limit |
| Caterpillar 3606 | 1775 | 0.50 | 1.96 | lbs/hr | Proposed Permit Limit |
| Engine Type | | VOC | | | |
| | HP | g/hp-hr | Factor | Units | Reference |
| Caterpillar 3520 B | 1675 | 1.00 | 3.69 | lbs/hr | Proposed Permit Limit |
| Waukesha 7044 GSI | 1680 | 1.00 | 3.70 | lbs/hr | Proposed Permit Limit |
| Caterpillar 3606 | 1775 | 1.00 | 3.91 | lbs/hr | Proposed Permit Limit |

| Engine Type | | SO _x | | | |
|--------------------|------|-----------------|----------|----------|---------------------------|
| | HP | | Factor | Units | Reference |
| Caterpillar 3520 B | 1675 | - | 5.88E-04 | lb/MMBTU | AP-42, Table 3.2-3 (7/00) |
| Waukesha 7044 GSI | 1680 | - | 5.88E-04 | lb/MMBTU | AP-42, Table 3.2-3 (7/00) |
| Caterpillar 3606 | 1775 | - | 5.88E-04 | lb/MMBTU | AP-42, Table 3.2-3 (7/00) |
| Engine Type | | PM-10 | | | |
| | HP | | Factor | Units | Reference |
| Caterpillar 3520 B | 1675 | - | 7.71E-05 | lb/MMBTU | AP-42, Table 3.2-2 (7/00) |
| Waukesha 7044 GSI | 1680 | - | 9.50E-03 | lb/MMBTU | AP-42, Table 3.2-3 (7/00) |
| Caterpillar 3606 | 1775 | - | 7.71E-05 | lb/MMBTU | AP-42, Table 3.2-3 (7/00) |
| Engine Type | | Formaldehyde | | | |
| | HP | g/hp-hr | Factor | Units | Reference |
| Caterpillar 3520 B | 1675 | 0.07 | 0.26 | lbs/hr | Manufacturer's Data |
| Waukesha 7044 GSI | 1680 | 0.05 | 0.19 | lbs/hr | Manufacturer's Data |
| Caterpillar 3606 | 1775 | 0.07 | 0.27 | lbs/hr | Manufacturer's Data |

Company

Compressor Station

2/14/07

Fuel Combustion Rate Calculation

| Type | Engine Model | Rating | Units | Btu/hp-hr | Maximum Fuel Combustion Rate | | | Annual Hours of Operation |
|-------------|--------------------|--------|-------|-----------|------------------------------|----------|----------|---------------------------|
| | | | | | MMBtu/hr | MMSCF/hr | MMSCF/yr | |
| 4-Stroke LB | Caterpillar 3520 B | 1675 | HP | 7,066 | 11.84 | 0.0118 | 103.68 | 8,760 |
| 4-Stroke RB | Waukesha 7044 GSI | 1680 | HP | 7,876 | 13.23 | 0.0132 | 115.91 | 8,760 |
| 4-Stroke LB | Caterpillar 3606 | 1775 | HP | 6,620 | 11.75 | 0.0118 | 102.93 | 8,760 |

Notes:

Btu/hp-hr - British Thermal Units per Horsepower Hour

MMBtu/hr - Million British Thermal Units per Hour

MMSCF/hr - Million Standard Cubic Feet per Hour

Company

Compressor Station

2/14/07

**Potential to Emit
Emissions Inventory**

| Emissions for Each Individual Engine Model | | | | | | | | | | | | | | |
|--|--------------------|----------------------|-------|---------|-------|---------|-------|---------|-------|---------|-------|---------|--------------|---------|
| Type | Engine Model | Horsepower Rating | NOx | | CO | | VOC | | SOx | | PM | | Formaldehyde | |
| | | | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr | lb/hr | tons/yr |
| 4-Stroke LB | Caterpillar 3520 B | 1,675 | 3.69 | 16.17 | 1.85 | 8.09 | 3.69 | 16.17 | 0.007 | 0.030 | 0.00 | 0.004 | 0.26 | 1.13 |
| 4-Stroke RB | Waukesha 7044 GSI | 1,680 | 3.70 | 16.22 | 7.41 | 32.44 | 3.70 | 16.22 | 0.008 | 0.034 | 0.13 | 0.55 | 0.19 | 0.81 |
| 4-Stroke LB | Caterpillar 3606 | 1,775 | 2.74 | 12.00 | 1.96 | 8.57 | 3.91 | 17.14 | 0.007 | 0.030 | 0.00 | 0.004 | 0.27 | 1.20 |

Engine Options

Up to **Two** of the following:

| | | |
|--------------------|-------|----|
| Caterpillar 3520 B | 1,675 | hp |
| Waukesha 7044 GSI | 1,680 | hp |
| Caterpillar 3606 | 1,775 | hp |

Company**Compressor Station****2/14/07****Worst Case NOx Emission Combination**

| Unit | Engine Model | Horsepower Rating | NOx | |
|---------|-------------------|----------------------|-------|--------------|
| | | | lb/hr | tons/yr |
| Unit #1 | Waukesha 7044 GSI | 1,680 | 3.70 | 16.22 |
| Unit #2 | Waukesha 7044 GSI | 1,680 | 3.70 | 16.22 |
| Total: | | | | 32.44 |

Worst Case CO Emission Combination

| Unit | Engine Model | Horsepower Rating | CO | |
|---------|-------------------|----------------------|-------|--------------|
| | | | lb/hr | tons/yr |
| Unit #1 | Waukesha 7044 GSI | 1,680 | 7.41 | 32.44 |
| Unit #2 | Waukesha 7044 GSI | 1,680 | 7.41 | 32.44 |
| Total: | | | | 64.89 |

Company**Compressor Station****2/14/2007****Facility-Wide Potential to Emit**

| Engine Model | Horsepower Rating | NOx tons/yr | CO tons/yr | VOC tons/yr | SOx tons/yr | PM tons/yr | HCHO tons/yr |
|-------------------------|-------------------|-------------|------------|-------------|-------------|------------|--------------|
| Large Engines (up to 2) | | | | | | | |
| Caterpillar 3520 B | 1675 | 16.17 | 8.09 | 16.17 | 0.030 | 0.004 | 1.132 |
| Waukesha 7044 GSI | 1680 | 16.22 | 32.44 | 16.22 | 0.034 | 0.551 | 0.811 |
| Waukesha 7044 GSI | 1680 | 16.22 | 32.44 | 16.22 | 0.034 | 0.551 | 0.811 |
| Caterpillar 3606 | 1775 | 12.00 | 8.57 | 17.14 | 0.030 | 0.004 | 1.200 |
| Facility Total | | 32.44 | 64.89 | 32.44 | 0.068 | 1.101 | 1.622 |

APPENDIX D
BACT DOCUMENTATION

BACT Summary**Company****Compressor Station**

| Engines | Horsepower (hp) | Type | Control Equipment | Catalyst Cost (\$) | NOx Controlled g/hp-hr | CO Controlled g/hp-hr | Amount of NOx Controlled tpy | Amount of CO Controlled tpy | NOx Annualized Control Costs (\$/yr) | NOx Cost Effectiveness \$/ton | CO Annualized Control Costs (\$/yr) | CO Cost Effectiveness \$/ton |
|-------------------------------|-----------------|------|-------------------|--------------------|------------------------|-----------------------|------------------------------|-----------------------------|--------------------------------------|-------------------------------|-------------------------------------|------------------------------|
| Caterpillar 3520 B (1,675 hp) | 1,675 | LB | LB/OC | \$20,000 | 1.0 | 0.5 | 16.2 | 40.4 | \$0 | \$0 | \$132,440 | \$3,278 |
| Waukesha 7044 GSI (1,680 hp) | 1,680 | RB | NSCR | \$25,000 | 1.0 | 2.0 | 308.0 | 129.7 | \$135,060 | \$439 | \$135,060 | \$1,042 |
| Caterpillar 3606 (1,775 hp) | 1,775 | LB | LB/OC | \$20,000 | 0.7 | 0.5 | 22.3 | 42.8 | \$0 | \$0 | \$138,840 | \$3,243 |

Notes: Amount of NOx controlled is the difference between 20 g/bhp-hr minus the controlled value for Rich burns and 2 g/bhp-hr minus the controlled value for lean burns.

Amount of CO controlled is the difference between 10 g/bhp-hr minus the controlled value for Rich burns and 3 g/bhp-hr minus the controlled value for lean burns.

LB - Lean Burn

RB - Rich Burn

OC - Oxidation Catalyst

NSCR - Non-Selective Catalytic Reduction

Company

Compressor Station

Caterpillar 3520 B (1,675 hp)

Capital Cost Estimation - CO Control Lean Burn Engine

| Cost Item | Factor | Cost |
|---|---------------------|----------|
| Direct Costs | | |
| Purchased Equipment Costs | | |
| Lean Burn Engine + Oxidation Catalyst, EC | As Estimated, A | \$20,000 |
| Instrumentation | 0.10 A | \$2,000 |
| Sales taxes | 0.03 A | \$600 |
| Freight | 0.05 A | \$1,000 |
| Purchased Equipment Cost, PEC | B = 1.18 A | \$23,600 |
| Direct Installation Costs | | |
| Foundations & Supports | 0.12 B | \$2,832 |
| Handling & Erection | 0.40 B | \$9,440 |
| Electrical | 0.01 B | \$236 |
| Piping | 0.02 B | \$472 |
| Insulation | 0.01 B | \$236 |
| Painting | 0.01 B | \$236 |
| Direct Installation Costs | 0.57 B | \$13,452 |
| Site Preparation | | |
| As Required, SP | | \$0 |
| Buildings | | |
| As Required, Building | | \$0 |
| Total Direct Costs, DC | 1.57 B + SP + Bldg. | \$37,052 |
| Indirect Annual Costs, DC | | |
| Engineering | 0.10 B | \$2,360 |
| Construction and Field Expenses | 0.10 B | \$2,360 |
| Contractor Fees | 0.10 B | \$2,360 |
| Start-up | 0.01 B | \$236 |
| Performance Test | 0.01 B | \$236 |
| Contingencies | 0.03 B | \$708 |
| Total Indirect Costs, IC | 0.35 B | \$8,260 |
| Total Capital Investment = DC + IC | 1.92 B + SP + Bldg. | \$45,312 |

Caterpillar 3520 B (1,675 hp)

Company -

Compressor Station

**Annual Costs Estimation - CO Control
Lean Burn Engine**

| Cost Item | Factor | Cost |
|---|---|------------------|
| Direct Annual Costs, DC | | |
| Operating Labor (3) | | |
| Operator | 630 man-hours per year @ \$18/hr | \$11,340 |
| Supervisor | 15% of operator | \$1,701 |
| Operating Material (Catalyst Replacement) | \$2,500 per year | \$2,500 |
| Maintenance | | |
| Labor | 1 person per 2,000 hp (man-years) @ \$40,000 salary per man-year | 0.84 \$33,500 |
| Material | 100 % of maintenance labor | \$33,500 |
| Utilities | | |
| Electricity | | \$500 |
| Indirect Annual Costs, IC | | |
| Overhead | 60 % of Total Labor and Materials Cost | \$40,200 |
| Administrative Charges | 2% of TCI | \$906 |
| Property Tax | 1% of TCI | \$453 |
| Insurance | 1% of TCI | \$453 |
| Capital Recovery | 0.163 * TCI | \$7,386 |
| Total Annual Cost | Sum of Direct and Indirect Annual Costs | \$132,440 |

Waukesha 7044 GSI (1,680 hp)

Company -

Compressor Station

Capital Cost Estimation - NOx Control Rich Burn Engine

| Cost Item | Factor | Cost |
|--------------------------------------|---------------------|----------|
| Direct Costs | | |
| Purchased Equipment Costs | | |
| Rich Burn Engine + NSCR Catalyst, EC | As Estimated, A | \$25,000 |
| Instrumentation | 0.10 A | \$2,500 |
| Sales taxes | 0.03 A | \$750 |
| Freight | 0.05 A | \$1,250 |
| Purchased Equipment Cost, PEC | B = 1.18 A | \$29,500 |
| Direct Installation Costs | | |
| Foundations & Supports | 0.12 B | \$3,540 |
| Handling & Erection | 0.40 B | \$11,800 |
| Electrical | 0.01 B | \$295 |
| Piping | 0.02 B | \$590 |
| Insulation | 0.01 B | \$295 |
| Painting | 0.01 B | \$295 |
| Direct Installation Costs | 0.57 B | \$16,815 |
| Site Preparation | | |
| As Required, SP | | \$0 |
| Buildings | | |
| As Required, Building | | \$0 |
| Total Direct Costs, DC | 1.57 B + SP + Bldg. | \$46,315 |
| Indirect Annual Costs, DC | | |
| Engineering | 0.10 B | \$2,950 |
| Construction and Field Expenses | 0.10 B | \$2,950 |
| Contractor Fees | 0.10 B | \$2,950 |
| Start-up | 0.01 B | \$295 |
| Performance Test | 0.01 B | \$295 |
| Contingencies | 0.03 B | \$885 |
| Total Indirect Costs, IC | 0.35 B | \$10,325 |
| Total Capital Investment = DC + IC | 1.92 B + SP + Bldg. | \$56,640 |

Waukesha 7044 GSI (1,680 hp)

Company -

Compressor Station

Annual Costs Estimation - NOx Control

Rich Burn Engine

| Cost Item | Factor | Cost |
|--|---|------------------|
| Direct Annual Costs, DC | | |
| Operating Labor (3) | | |
| Operator | 630 man-hours per year @ \$18/hr | \$11,340 |
| Supervisor | 15% of operator | \$1,701 |
| Operating Material (Replacement Parts) | \$2,500 per year | \$2,500 |
| Maintenance | | |
| Labor | 1 person per 2,000 hp (man-years) @ \$40,000 salary per man-year | 0.84 \$33,600 |
| Material | 100 % of maintenance labor | \$33,600 |
| Utilities | | |
| Electricity | | \$500 |
| Indirect Annual Costs, IC | | |
| Overhead | 60 % of Total Labor and Materials Cost | \$40,320 |
| Administrative Charges | 2% of TCI | \$1,133 |
| Property Tax | 1% of TCI | \$566 |
| Insurance | 1% of TCI | \$566 |
| Capital Recovery | 0.163 * TCI | \$9,232 |
| Total Annual Cost | Sum of Direct and Indirect Annual Costs | \$135,060 |

Compressor Station

Waukesha 7044 GSI (1,680 hp)

Capital Cost Estimation - CO Control

Rich Burn Engine

| Cost Item | Factor | Cost |
|--------------------------------------|---------------------|----------|
| Direct Costs | | |
| Purchased Equipment Costs | | |
| Rich Burn Engine + NSCR Catalyst, EC | As Estimated, A | \$25,000 |
| Instrumentation | 0.10 A | \$2,500 |
| Sales taxes | 0.03 A | \$750 |
| Freight | 0.05 A | \$1,250 |
| Purchased Equipment Cost, PEC | B = 1.18 A | \$29,500 |
| Direct Installation Costs | | |
| Foundations & Supports | 0.12 B | \$3,540 |
| Handling & Erection | 0.40 B | \$11,800 |
| Electrical | 0.01 B | \$295 |
| Piping | 0.02 B | \$590 |
| Insulation | 0.01 B | \$295 |
| Painting | 0.01 B | \$295 |
| Direct Installation Costs | 0.57 B | \$16,815 |
| Site Preparation | | |
| As Required, SP | | \$0 |
| Buildings | | |
| As Required, Building | | \$0 |
| Total Direct Costs, DC | 1.57 B + SP + Bldg. | \$46,315 |
| Indirect Annual Costs, DC | | |
| Engineering | 0.10 B | \$2,950 |
| Construction and Field Expenses | 0.10 B | \$2,950 |
| Contractor Fees | 0.10 B | \$2,950 |
| Start-up | 0.01 B | \$295 |
| Performance Test | 0.01 B | \$295 |
| Contingencies | 0.03 B | \$885 |
| Total Indirect Costs, IC | 0.35 B | \$10,325 |
| Total Capital Investment = DC + IC | 1.92 B + SP + Bldg. | \$56,640 |

Waukesha 7044 GSI (1,680 hp)

Company -

Compressor Station

Annual Costs Estimation - CO Control
Rich Burn Engine

| Cost Item | Factor | Cost |
|---|---|------------------|
| Direct Annual Costs, DC | | |
| Operating Labor (3) | | |
| Operator | 630 man-hours per year @ \$18/hr | \$11,340 |
| Supervisor | 15% of operator | \$1,701 |
| Operating Material (Catalyst Replacement) | \$2,500 per year | \$2,500 |
| Maintenance | | |
| Labor | 1 person per 2,000 hp (man-years) @ \$40,000 salary per man-year | 0.84 \$33,600 |
| Material | 100 % of maintenance labor | \$33,600 |
| Utilities | | |
| Electricity | | \$500 |
| Indirect Annual Costs, IC | | |
| Overhead | 60 % of Total Labor and Materials Cost | \$40,320 |
| Administrative Charges | 2% of TCI | \$1,133 |
| Property Tax | 1% of TCI | \$566 |
| Insurance | 1% of TCI | \$566 |
| Capital Recovery | 0.163 * TCI | \$9,232 |
| Total Annual Cost | Sum of Direct and Indirect Annual Costs | \$135,060 |

Company -

Compressor Station

Caterpillar 3606 (1,775 hp)

Capital Cost Estimation - CO Control

Lean Burn Engine

| Cost Item | Factor | Cost |
|---|---------------------|----------|
| Direct Costs | | |
| Purchased Equipment Costs | | |
| Lean Burn Engine + Oxidation Catalyst, EC | As Estimated, A | \$20,000 |
| Instrumentation | 0.10 A | \$2,000 |
| Sales taxes | 0.03 A | \$600 |
| Freight | 0.05 A | \$1,000 |
| Purchased Equipment Cost, PEC | B = 1.18 A | \$23,600 |
| Direct Installation Costs | | |
| Foundations & Supports | 0.12 B | \$2,832 |
| Handling & Erection | 0.40 B | \$9,440 |
| Electrical | 0.01 B | \$236 |
| Piping | 0.02 B | \$472 |
| Insulation | 0.01 B | \$236 |
| Painting | 0.01 B | \$236 |
| Direct Installation Costs | 0.57 B | \$13,452 |
| Site Preparation | | |
| As Required, SP | | \$0 |
| Buildings | | |
| As Required, Building | | \$0 |
| Total Direct Costs, DC | 1.57 B + SP + Bldg. | \$37,052 |
| Indirect Annual Costs, DC | | |
| Engineering | 0.10 B | \$2,360 |
| Construction and Field Expenses | 0.10 B | \$2,360 |
| Contractor Fees | 0.10 B | \$2,360 |
| Start-up | 0.01 B | \$236 |
| Performance Test | 0.01 B | \$236 |
| Contingencies | 0.03 B | \$708 |
| Total Indirect Costs, IC | 0.35 B | \$8,260 |
| Total Capital Investment = DC + IC | 1.92 B + SP + Bldg. | \$45,312 |

Caterpillar 3606 (1,775 hp) Company - Compressor Station

**Annual Costs Estimation - CO Control
Lean Burn Engine**

| Cost Item | Factor | Cost |
|---|---|------------------|
| Direct Annual Costs, DC | | |
| Operating Labor (3) | | |
| Operator | 630 man-hours per year @ \$18/hr | \$11,340 |
| Supervisor | 15% of operator | \$1,701 |
| Operating Material (Catalyst Replacement) | \$2,500 per year | \$2,500 |
| Maintenance | | |
| Labor | 1 person per 2,000 hp (man-years) @ \$40,000 salary per man-year | 0.89 \$35,500 |
| Material | 100 % of maintenance labor | \$35,500 |
| Utilities | | |
| Electricity | | \$500 |
| Indirect Annual Costs, IC | | |
| Overhead | 60 % of Total Labor and Materials Cost | \$42,600 |
| Administrative Charges | 2% of TCI | \$906 |
| Property Tax | 1% of TCI | \$453 |
| Insurance | 1% of TCI | \$453 |
| Capital Recovery | 0.163 * TCI | \$7,386 |
| Total Annual Cost | Sum of Direct and Indirect Annual Costs | \$138,840 |